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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/816,169

04/02/2004

Marcel Mathijs Theodore Marie Dierichs

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7590

03/08/2007

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EXAMINER

CHACKO DAVIS, DABORAH

ART UNIT

PAPER NUMBER

1756

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/08/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/816,169

Applicant(s)

DIERICHS, MARCEL MATHIJS
THEODORE MARIE

Examiner

Daborah Chacko-Davis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 November 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-25,27-44 and 46-62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-25,27-44 and 46-62 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Applicant's Pre-Appeal Brief Request For Review, filed November 16, 2006, for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-6, 8-13, 15-25, 27-32, 34-38, and 58-62, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 2005/0136334 (Dierichs et al., hereinafter referred to as Dierichs) in view of U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) and U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami).

Dierichs, in [0007], [0008], [0017], [0029], [0030], [0031], [0032], [0033], [0043], discloses a lithographic apparatus and a device manufacturing method comprising an illumination system that provides a projection beam of radiation, a support structure for supporting the patterning device that imparts a pattern to the projection beam of radiation, a substrate table that holds the substrate, a projection system (PL) for projecting the patterned beam onto a portion of the substrate, wherein the patterning device (mask) comprises an absorber layer, wherein the patterning structure improves

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the contrast of the patterned image formed on the substrate (minimizes spherical aberration) (claims 1, 20). Dierichs, in [0018], [0033], discloses that the projection system that projects the patterned beam comprises refractive optical systems (refractive means) and reflective optical systems (reflective means) (claims 17, 36). Dierichs, in [0015], discloses that the radiation used includes EUV radiation having a wavelength in the range of about 5-20 nm (claims 18-19, 37-38). Dierichs, in [0014], disclose that the lithographic apparatus can be used to manufacture ICs, integrated optical systems, guidance and detection patterns for magnetic domain memories, LCDs, and thin-film magnetic heads (claims 58-62).

The difference between the claims and Dierichs is that Dierichs does not disclose that the patterning structure comprises an aluminum absorber layer of the claimed thickness with a protective top coating. Dierichs does not disclose that the aluminum forms a substantially flat surface (claims 2, 21). Dierichs does not disclose that the aluminum has a substantially constant thickness (claims 3, 22). Dierichs does not disclose that the aluminum has thickness of about 50nm to about 200nm (claims 4, 23). Dierichs does not disclose that the aluminum has a thickness of about 70nm (claims 5, 24). Dierichs does not disclose that the protective top coating is selected from the group recited in claims 6, and 25. Dierichs does not disclose a protective coating of the claimed thickness (about 1nm) (claims 8, and 27). Dierichs does not disclose that the patterning structure comprises a bottom substrate material with a low coefficient of thermal expansion (claims 9, 28). Dierichs does not disclose a series of alternating layers of high index refraction material and low index refraction material beneath the

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aluminum layer (claims 10, 29). Dierichs does not disclose that the alternating layers of low index and high index material comprise 20 to about 80 layers (claims 11, 30).

Dierichs does not disclose the claimed combinations of high index and low index refraction material recited in claims 12, and 31. Dierichs does not disclose that the high and low index refraction material layers have the claimed thickness recited in claims 13, and 32. Dierichs does not disclose that the patterning structure comprises a silicon dioxide buffer layer (claims 15-16, and 34-35).

Yan, in col 2, lines 18-65, in col 3, lines 4-26, and in figure 1(e), discloses that the patterning structure (mask) comprises a glass-ceramic material layer (substrate material) of low coefficient of thermal expansion, a multilayer mirror of alternating layers of high index and low index material, a buffer layer, an aluminum absorber layer, and a top protective layer. Yan, in col 3, lines 4-14, and in figure 1(d), discloses a substantially flat aluminum absorber layer (reference 1400), that may be formed of a thickness of about 45 to 215nm (substantially constant). Yan, in col 3, lines 5-16, and lines 33-36, and lines 42-52, discloses that top layer is formed by treating the absorber layer (aluminum) with a plasma of oxygen, nitrogen etc (resulting in the formation of a corresponding oxide or nitride). Yan, in col 3, lines 24-26, discloses that the protective top layer is thinner than the absorber layer and may be about 20 nm. Yan, in col 2, lines 18-47, and in col 3, lines 4-6, discloses that a multilayer mirror (prior to absorber layer formation, beneath the absorber layer, see figures 1(b) through 1(d)) of about 20-80 pairs of alternating layers of high refractive index material (Mo) and low refractive index material (Si) that have a thickness of about 2.8nm and 4.1nm respectively. Yan,

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in col 2, lines 18-26, and lines 60-65, and figures 1(b) through 1(c) discloses that the patterning structure (mask) includes a buffer layer that may be formed of silicon dioxide.

The difference between the claims and Yan is that Yan does not disclose that the protective top coating has a thickness of about 0.1 to 5nm. Yan does not disclose that the protective top coating has a thickness of about 1nm .

Murakami, in [0083], [0088], and in [0094], discloses that the protective top coating can grow to a thickness of 2nm on the absorbing-body layer (absorber layer).

Therefore, it would be obvious to a skilled artisan to modify Dierichs by employing the mask structure taught by Yan because Dierichs discloses a mask structure that comprises an absorber layer, Yan, in the abstract, in col 2, lines 14-16, discloses that using the claimed mask enables the use of the mask with high contrast (between the absorber region and the mirror region) at the inspection wavelength (EUV). It would be obvious to a skilled artisan to modify Dierichs in view of Yan by employing the claimed thickness of the protective layer of the multi-layer film mirror stack as suggested by Murakami because Murakami, in [0056], discloses that the formation of the protective layer (in the claimed thickness upto 2nm i.e., about 1nm) on the absorbing body layer completes the formation of the multilayer-film mirror and in [0036], and [0037], discloses that the protective layer prevents the accumulation of contaminants on the EUV reflective reticle.

4. Claims 14, and 33, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 2005/0136334 (Dierichs et al., hereinafter referred to as Dierichs)

in view of U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) and U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami).as applied to claims 1-13, 15-32, 34-38, and 58-62, above, and further in view of U. S. Patent Application Publication No. 2005/0040413 (Takahashi et al., herein after referred to as Takahashi).

Dierichs in view of Yan and Murakami is discussed in paragraph no. 3.

The difference between the claims and Dierichs in view of Yan and Murakami is that Dierichs in view of Yan and Murakami does not disclose a barrier layer between the high and low index refraction material layer (claim 14, and 33).

Takahashi, [1102], discloses an intermediate layer is interposed between the high refractive index layer and the low refractive index layer.

Therefore, it would be obvious to a skilled artisan to modify Dierichs in view of Yan by employing the method of incorporating a barrier layer between the high index layer and the low index layer as taught by Takahashi because Takahashi, [1102], discloses that doing so reduces the resistance of the multilayer reflector.

5. Claims 39-44, 46-51, and 53-57, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) in view of U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami).

Yan, in col 2, lines 18-65, in col 3, lines 4-26, and in figure 1(e), discloses a

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patterning structure (mask) that can be used in lithography comprising a glass-ceramic material layer (substrate material) of low coefficient of thermal expansion, a multilayer mirror of alternating high index and low index material, a buffer layer, an aluminum absorber layer, and a very thin top protective layer, wherein the absorber layer imparts the pattern to the beam of projected radiation (part of a mask structure) (claims 39, 47, and 55). Yan, in col 3, lines 4-14, and in figure 1(d), discloses a substantially flat aluminum absorber layer (reference 1400), that may be formed of a thickness of about 45 to 215nm (substantially constant) (claims 40-42). Yan, in col 3, lines 5-16, and lines 33-36, and lines 42-52, discloses that top layer is formed by treating the absorber layer (aluminum) with a plasma of oxygen, nitrogen etc (resulting in the formation of a corresponding oxide or nitride) (claim 44). Yan, in col 3, lines 24-26, discloses that the protective top layer is thinner than the absorber layer and may be about 20 nm. Yan, in col 2, lines 18-47, and in col 3, lines 4-6, discloses that a multilayer mirror (prior to absorber layer formation, beneath the absorber layer, see figures 1(b) through 1(d)) of about 20-80 pairs of alternating layers of high refractive index material (Mo) and low refractive index material (Si) that have a thickness of about 2.8nm and 4.1nm respectively (claims 48-51). Yan, in col 2, lines 18-26, and lines 60-65, and figures 1(b) through 1(c) discloses that the patterning structure (mask) includes a buffer layer that may be formed of silicon dioxide (claims 53-54). Yan, in col 4, lines 4-26, and in figures 1(e) through 2(a) discloses that the a photoresist layer (radiation-sensitive layer, reference 1600) is formed on the protective top layer (reference 1500), and is then

exposed, and developed to form a patterned photoresist which is then subject to reactive ion-etching to etch to form a pattern in the layers beneath (claims 56-57).

The difference between the claims and Yan is that Yan does not disclose that the protective top coating has a thickness of about 0.1 to 5nm. Yan does not disclose that the protective top coating has thickness of about 1nm (claim 46).

Murakami, in [0083], [0088], and in [0094], discloses that the protective top coating can grow to a thickness of 2nm on the absorbing-body layer (absorber layer).

Therefore, it would be obvious to a skilled artisan to modify Yan by employing the claimed thickness of the protective layer of the multi-layer film mirror stack as suggested by Murakami because Murakami, in [0056], discloses that the formation of the protective layer (in the claimed thickness upto 2nm i.e., about 1nm) on the absorbing body layer completes the formation of the multilayer-film mirror and in [0036], and [0037], discloses that the protective layer prevents the accumulation of contaminants on the EUV reflective reticle.

6. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) in view of U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami) as applied to claims 49-44, 46-51, and 53-57, above and further in view of U. S. Patent Application Publication No. 2005/0040413 (Takahashi et al., herein after referred to as Takahashi).

Yan in view of Murakami is discussed in paragraph no. 5.

The difference between the claim and Yan in view of Murakami is that Yan in view of Murakami does not disclose a barrier layer between the high and low index refraction material layer (claim 52).

Takahashi, [1102], discloses an intermediate layer is interposed between the high refractive index layer and the low refractive index layer.

Therefore, it would be obvious to a skilled artisan to modify Yan in view of Murakami by employing the method of incorporating a barrier layer between the high index layer and the low index layer as taught by Takahashi because Takahashi, [1102], discloses that doing so reduces the resistance of the multilayer reflector.

Response to Arguments

7. Applicant's arguments with respect to claims 1-6, 8-25, 27-44, and 46-62, filed November 16, 2006, have been considered but are moot in view of the new ground(s) of rejection. See paragraph nos. 3, and 5.

Conclusion

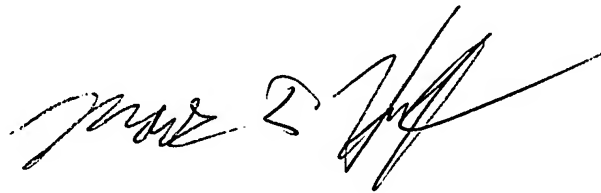
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent

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Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

February 28, 2007.

A handwritten signature in black ink, appearing to read "Mark A. Kuff", with a stylized flourish extending from the end.

MARK A. KUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1720